

# An engine called Essex

While the V engine configuration pre-dates the motor car, its six-cylinder variant is a relatively recent creation: the V6 was first offered by Lancia in 1950. Nowadays any car maker worth its salt has a V6 engine in its portfolio but it should be remembered that, in the Sixties, Ford's then-separate German and British arms were the first mainstream manufacturers to mass-produce the V6, along with its V4 second cousin.

The Dagenham-created versions, the Essex family, went on to power a wide range of Fords and the V6 was also used in, among others, TVR, Reliant and AC sports cars. Yet, intriguingly, the distinctive V layout was not conceived for use in a car but in the Transit van of 1965. This was the first Ford product to be built in both Britain and Germany and anticipated the creation, in 1967, of Ford of Europe. The engines were created against the background of ever-closer cooperation between the two centres but the dialogue was not without its problems.

The story of the Essex begins in 1961. In September of that year Ford's product planning manager, Terence Beckett, chaired a product strategy meeting at Dagenham. One of the matters under consideration was the engines for the next generation of cars and vans. The intention was to develop a new range of power units that could be employed for these dual applications.

## WHAT'S IN A NAME?

Hitherto, Ford engine design had been the responsibility of a team consisting of Alan Aitken, John Pask and George Soule, under the direction of Alan Worters. But on these new units they were to work in conjunction with product planners (see panel, p102). At the September meeting, Philip Ives was appointed manager of the new engine and transmissions planning department.

From the outset, it was recognised that the engines would have a number of jobs to do. Phil Ives remembers: "It soon became apparent that the 'production slot' was a particularly complex one. For a start they had to be capable of powering the Consul/Zephyr/Zodiac cars, 10-25cwt vans and to cover industrial and marine usage. High- and low-compression versions were required."

What Phil Ives needed first was a codename for the programme. The team opted for 'Essex', on the simple grounds that Ford's headquarters and outlying facilities were within that county. It then made sense when a diesel intended for the D Series truck was called the 'Dorset', and when the Cortina's smaller four was converted, in 1967, to a bowl-in-piston design, it became the 'Kent' because Alan Worters lived there!

The van was intended to be known as 'Transit' only in Germany, where the name was already established; the British version was to be marketed under the 'V Series' banner.

The Transit was to be built in both Britain and Germany, so a further requirement was that the van version of the Essex would go into the same engine bay as the existing

Ford of Germany 1,500cc V4 (a US-designed unit that powered the Cortina's Taunus 12M rival). Internationally, the engines would have to bridge the gap between that engine and Ford Canada's 3.5-litre V8.

In the 1960s a car's production life was usually set at five years, a commercial vehicle's was 10 but an engine had to last for 15 to 20 years. It was thus essential for Ives' planners to look at future design trends. The company had a longstanding commitment to the front-engine/rear-drive concept but by 1961 Issigonis' front-wheel-drive Mini, to Ford's discomfort, had made a considerable impact on the British market and its 1100 derivative was waiting in the wings. Thus, employing the Essex in FWD mode was contemplated. Studies were undertaken for so using the V6 with automatic transmission in the projected Zephyr/Zodiac MkIV range but, eventually, a conventional rear-drive format prevailed.

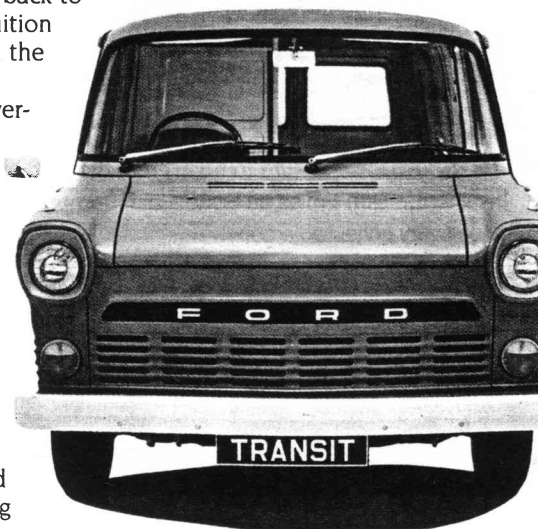
Another possibility was a diesel derivative. This would have been a 3.2-litre V6 lined back to 2,900cc but it did not reach fruition and the Transit was offered with the option of a Perkins diesel.

The van application made an overriding contribution to the engine's configuration. The Transit was central to Ford's attempt to boost its then-modest share of the commercial vehicle market.

Ives recalls that in the early 1960s, "The VW Transporter was the best-seller in its class and that, of course, had a flat-four rear-mounted engine. There was no question of us following this layout, although we did look at it, but there was a feeling

*Ford of Britain's V4/V6 series powered various cars, besides Transit vans in the UK and Germany. Jonathan Wood tells the tale*

*Transit van application played large part in determining Ford's choice of V configuration for its new engine range*





*Essex made its first car appearance, in V4 form, in Corsair range of 1965*

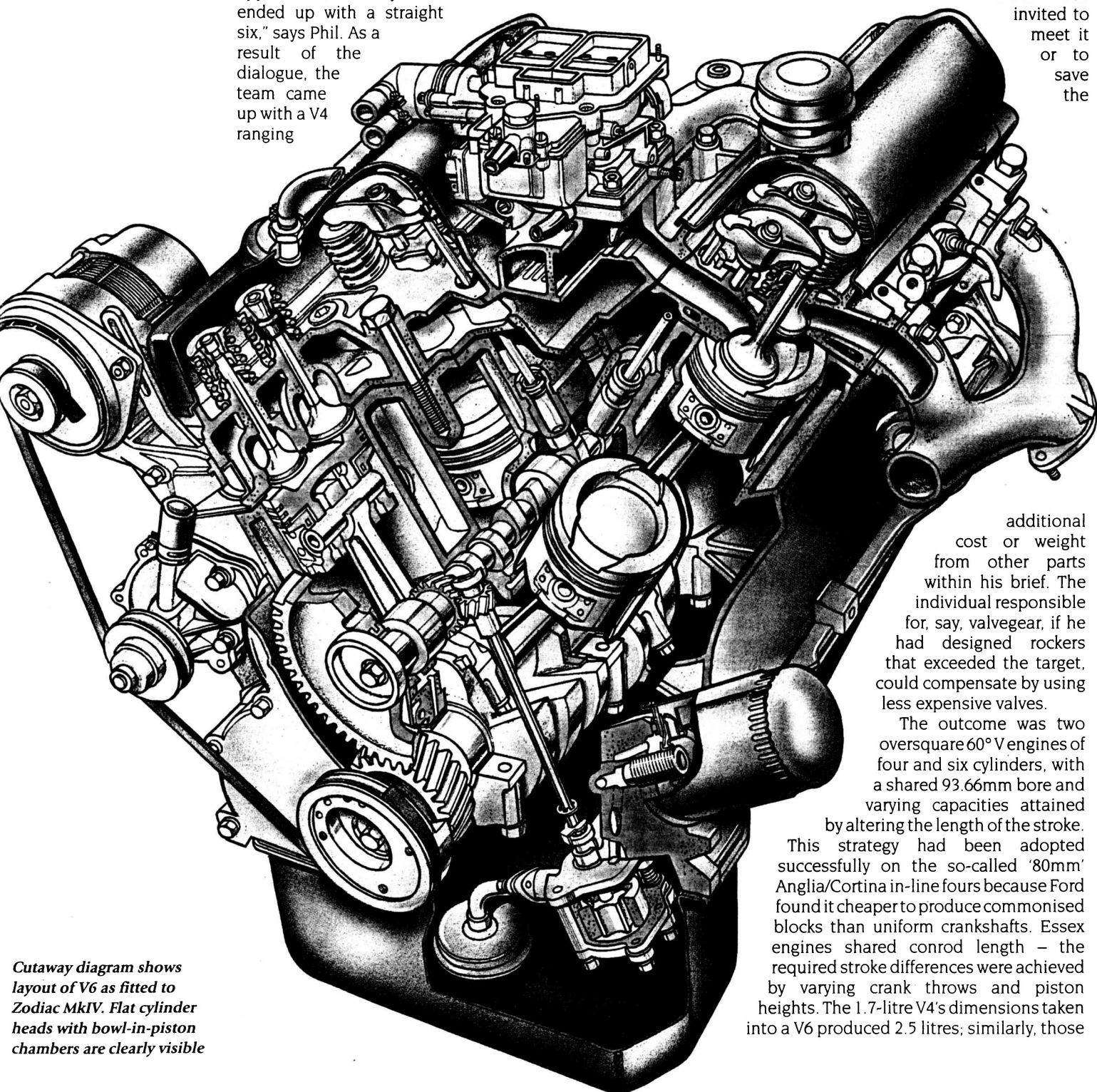
that great importance would be attached to ease of driver access, which the VW possessed." Herein lay the appeal of the compact V4, with its lack of intrusion into the driving compartment, compared with its in-line equivalent.

Ives' product planning team of Graham Bowie, John Ellinghouse and Ken Brown began lengthy discus-

sions with Alan Worters about the merits and demerits of the flat, in-line and V-format four- and six-cylinder engines. "His experience was of in-line engines... had the engine purely had an automobile application, we may well have ended up with a straight six," says Phil. As a result of the dialogue, the team came up with a V4 ranging

from 1,650 to 2,200cc and a V6 covering 1,800 to 3,200cc. The proposals were presented to Ford Britain's Product Committee, presided over by Sir Patrick Hennessey, and approval was given for creating prototypes.

In the next, crucial stage in the evolution of the Essex the product planners were directly involved in the design process. Huge wallboards were prepared that included components of existing Ford in-line, V4 and V8 engines, together with competitors' engine parts. Each was identified with its 'Made in Dagenham' price and investment cost and weight estimates. A 'Red Book' (so-called because of its cover) of the type that had proved so effective in developing the Cortina was compiled for each engine. This contained the target price and investment cost and weight for each component, from the cylinder block to each nut and bolt. Where a new component exceeded targets, each design engineer was invited to meet it or to save the



*Cutaway diagram shows layout of V6 as fitted to Zodiac MkIV. Flat cylinder heads with bowl-in-piston chambers are clearly visible*

additional cost or weight from other parts within his brief. The individual responsible for, say, valvegear, if he had designed rockers that exceeded the target, could compensate by using less expensive valves.

The outcome was two oversquare 60° V engines of four and six cylinders, with a shared 93.66mm bore and varying capacities attained by altering the length of the stroke.

This strategy had been adopted successfully on the so-called '80mm' Anglia/Cortina in-line fours because Ford found it cheaper to produce commonised blocks than uniform crankshafts. Essex engines shared conrod length – the required stroke differences were achieved by varying crank throws and piston heights. The 1.7-litre V4's dimensions taken into a V6 produced 2.5 litres; similarly, those

## Product planning



**Sir Patrick Hennessey - he instigated product planning**

Today, product planning is practised throughout the motor industry but it was unknown among 1950s UK car makers - with the exception of Ford, which introduced the concept in 1953. According to Philip Ives, "In 1953 Ford introduced its 300E van. On seeing a pre-production example, the commercial sales manager, Gerry

Phipps, produced a tape measure, which showed that it was 32in high - at a time when the average fridge or washing machine (which it was supposedly to carry) was 36in tall..." The MD, Sir Patrick Hennessey, was not amused. He'd seen product planning at work in the US and decided to implement it at Dagenham.

Most car companies then planned production in a haphazard way. Says Ives, "The managing director might be having lunch with his chief engineer and sales director, and a new model might well emerge, informally, from these discussions." Product planning provided a central organisation intended to ensure that the product met all its requirements - at the right price, the right weight, produced in the right manufacturing mode.

When product planning was introduced at Ford it met with considerable opposition from the engineering, sales, financial and manufacturing divisions because it took responsibility away from each. The first product planning manager was Martin Tustin but in 1954 he was replaced by Terence Beckett (knighted in 1978), who, as an engineer and economist, was ideally qualified for the task. The first Ford car on which product planning impinged was the 1961 Classic, which proved a disappointment, but the Cortina of 1962 was a runaway success and Beckett went on to become chairman of Ford of Britain. The rest, as Henry Ford might not have said, is history.

of the 2-litre V4 used in V6 form resulted in the 3-litre unit. With manufacturing costs an ever-present consideration, a bowl-in-piston design was adopted as it resulted in a flat-faced cylinder head. This meant that the transfer machining equipment producing the heads for the V6 could also accommodate those for the V4.

There were drawbacks in the design. The compact dimensions of a V engine are offset by the fact that they are heavier (and also therefore more expensive) than their in-line equivalents. This particularly applied to the V4, which required that half its counterweights rotate with the crankshaft and the other half on a secondary shaft driven in the opposite direction, at the same speed, to balance the primary forces generated.

Discussions were meanwhile proceeding between the planners and the manufacturing, purchasing and financial departments. These culminated in an investment of £14 million for the Essex programme and included essential alterations to the Dagenham engine plant. A maximum target output of 240,000 engines per annum, the equivalent of 1,000 a day on two shifts, was attainable, with break-even set at 140,000 units. In the event, peak annual production reached some 200,000 engines.

In due course, Philip Ives had to visit Dearborn to discuss the Essex programme with his American counterparts and also the higher echelons of the Ford Motor Company. One of these individuals, whom Ives was not looking forward to meeting, was Charles H Patterson, worldwide director of manufacturing. Says Ives: "CHP, as he was known, was the only person I ever heard of who signed an engine plant. He did this in wet concrete at Ford's Cologne works - it's probably still there.

"The trouble was that he was known for having a very short fuse and I was expecting a hard time. However, as soon as he heard my Scottish accent - I come from Dundee - he dropped his American twang and, to my amazement, took on a Scottish one, questioning 'Whaur dae ye come frae?'" Patterson hailed from Aberdeen and the remainder of the meeting was conducted in broad Scots, to the consternation of the Americans in attendance, who had imagined that they would be witnessing the usual barrage of invective. The rapport with Patterson would prove its worth in the future.

By December 1963 the Essex programme was sufficiently advanced for Beckett and Ives to cross the Atlantic again, this time to attend a meeting of the Ford Operating Policy Committee, chaired by Henry Ford II. They were there to seek approval for the investment required to make the V engines a reality.

## RIVAL POWER BIDS

This was an era when Ford was looking towards an integration of its British and German businesses, and the Transit was intended as its first European vehicle. Animosities existed between the two centres, rooted in both the usual corporate rivalries and, inevitably, for some, memories of WWII. In 1961 the parent company had purchased, for \$368 million (£150 million), the outstanding stock in Ford Britain still in domestic hands, as a prerequisite to a full integration. This policy was fiercely, albeit fruitlessly, opposed by British Ford's Hennessey. Despite the impending marriage, Dagenham and Cologne were pursuing their own product lines. Ford Germany was preparing to introduce its own 2-litre V6 (created, like its V4 stablemate, by Ford USA), which arrived in the 1964 Taunus 20M.

Rivalries soon manifested themselves at the meeting. Ford of Germany made it clear that it wished to install its own V4 in the Transit and did not want the Essex. Thus Cologne proposed its own engine programme, immediately prior to discussion of the Essex. Ives recalls: "To our surprise, John Andrews, Ford Cologne's American general manager, concluded his address by playing a tape recording of a despondent Harold Macmillan trying to explain away General de Gaulle's rejection of Britain's application to join the Common Market, which had occurred at the beginning of the year." Andrews rounded off his pre-emptive strike with a quote from *The Economist* to the effect that this refusal would deter foreign investment in Britain.

Ives says that Terry Beckett made an immediate response by stating

## Engine spec

### 1965 1.7-litre V4

Layout: 60° V4  
Bore & stroke: 93.66 x 60.35mm  
Displacement: 1,663cc  
Valves: overhead, pushrod-operated  
Power: 76.5bhp at 4,750rpm

### 2-litre V4

As above, except:  
Stroke: 72.41mm  
Displacement: 1,996cc  
Power: 88bhp at 4,750rpm

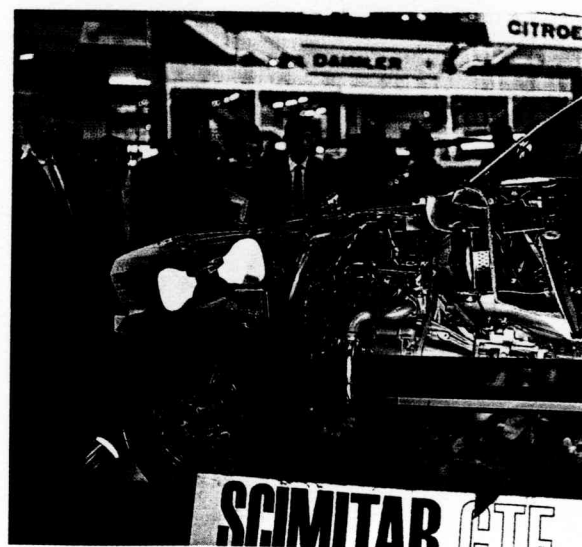
### 1966 2.5-litre V6

Layout: 60° V6  
Bore & stroke: 93.66 x 60.30mm  
Displacement: 2,495cc  
Valves: overhead, pushrod-operated  
Power: 103bhp at 4,700rpm

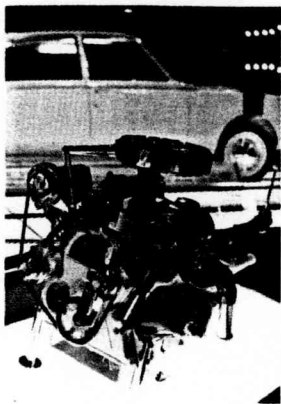
### 3-litre V6

As above, except:  
Stroke: 72.41mm  
Displacement: 2,994cc  
Power: 128bhp at 4,500rpm

*Shown in sectioned profile at '68 Motor Show, Reliant's Scimitar GTE was one of several cars from specialist producers to put torque V6 to good use*







*V4 was used until 1970 in Corsair, in 1.7- and 2-litre sizes. Larger unit produced as much as 93bhp*

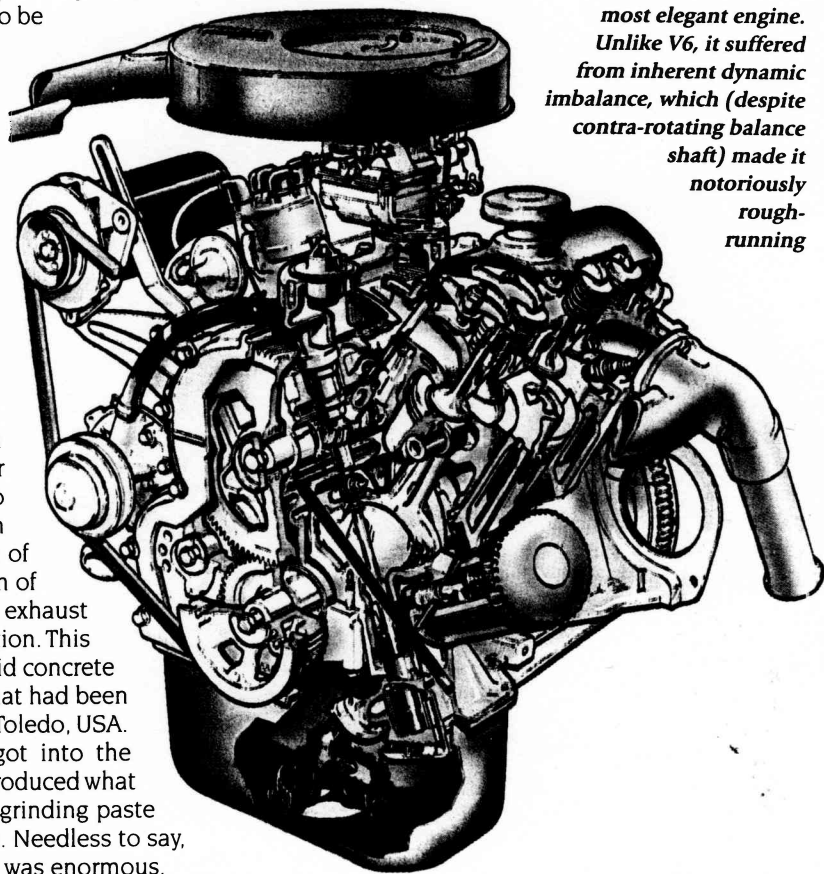
that this rejection of Britain was only a temporary setback and that the UK was certain to be in the Common Market before long. If the committee was concerned by this issue, Beckett recommended that a decision on both engine programmes should be held over until a later date. Fortunately, in Ives' recollection, "Henry Ford II did not seem to be too impressed with Ford of Germany's tactics and ruled that we should go ahead with the Essex presentation."

In addition to the cost of the engine, the £14 million package also included an initial investment of 60% of the cost of tools necessary to attain the projected 240,000 engines per annum figure, with the 40% balance to be spent at a later date. The plan included funding for the installation of all the underfloor services in the form of swarf conveyors, cutting lines and exhaust extractors, prior to the start of production. This would avoid digging up an already laid concrete floor, so as not to repeat a mistake that had been perpetrated at a Ford engine plant at Toledo, USA. There the dust that resulted had got into the cutting oil of the machine tools and produced what was, in effect, an extremely efficient grinding paste that affected a huge batch of engines. Needless to say, the rectification cost to the company was enormous.

Despite this experience, finance director 'Arjay' Miller protested at Dagenham's proposed expenditure, which, he maintained, could be delayed. Ives recalls: "Immediately, Charles H Patterson, who was also present, responded, 'Arjay, you're nickel-and-diming again!' Everyone then looked at Mr Ford, who smiled and said, 'I think perhaps in view of our past unfortunate experience, this is a sensible measure.' Collapse of Arjay Miller..."

Beckett and Ives left the meeting with approval to put the Essex engines into production and a commendation from the chairman. The V4 appeared first, nearly two years later, in the autumn of 1965, in the Corsair car and Transit van.

The British Transit van became so-titled just eight weeks before its October launch, when car and truck group director Bill Batty viewed a German Transit at Warley and promptly decided to drop the V Series name,



*V4 Essex was not Ford's most elegant engine. Unlike V6, it suffered from inherent dynamic imbalance, which (despite contra-rotating balance shaft) made it notoriously rough-running*

so that the Transit designation was common, along with the body, to both countries. The van, of course, proved to be immensely popular. It became market leader in 1966 and its successor remains so to this day.

Few would argue that the V4 was less of a success in the Corsair and by 1974 it had ceased to be used in Ford cars. In 1966 the V6 appeared in the slow-selling Mark IV Zephyr/Zodiac range but its torquey, accelerative qualities made it plenty of friends in the Capri 3000-series cars, which it powered until 1981. The V6 also performed with distinction in such non-Ford products as the Reliant GTE, TVR 3000M and AC 3000ME.

By 1978 the V4 had been discontinued altogether but the V6 remained as a popular option in the van until 1988. Well over a million Essex engines were built in all. For the teams involved, there could be no greater endorsement of a good job well done.

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CARS

The writer gratefully acknowledges the assistance of Philip Ives and Sir Terence Beckett in the preparation of this article

## V4 production history

<b>Oct 1965</b>	Corsair 1.7 & 2-litre UK-built Transit van 1.7 & 2-litre
<b>April 1966</b>	Zephyr Four Mark IV 2-litre
<b>June 1967</b>	Ford of Europe established
<b>Nov 1968</b>	Corsair 1.7-litre discontinued
<b>March 1969</b>	UK-built Capri 2-litre
<b>June 1970</b>	Corsair 2-litre discontinued
<b>Dec 1971</b>	Zephyr Four 2-litre discontinued Consul 2-litre
<b>March 1972</b>	Capri 2-litre discontinued
<b>March 1974</b>	Consul 2-litre discontinued; final use of V4 in a Ford car
<b>July 1974</b>	Transit 1.7-litre discontinued
<b>1975</b>	Transit 2-litre discontinued
<b>Jan 1978</b>	



*Consul/Granada used V4 till 1974*



*Rare Capri RS3100 had 148bhp V6*

## V6 production history

<b>April 1966</b>	Zephyr Six Mark IV 2.5-litre Zodiac Mark IV 3-litre
<b>June 1967</b>	Ford of Europe established
<b>Sept 1969</b>	UK-built Capri 3-litre
<b>Late 1970</b>	Transit 2.5-litre
<b>Dec 1971</b>	Zephyr Six/Zodiac 2.5 & 3-litre discontinued
<b>March 1972</b>	Consul/Granada (May) 2.5 & 3-litre
<b>Nov 1973</b>	Capri RS3100 3.1-litre
<b>Late 1973</b>	Transit 2.5-litre discontinued, 3-litre introduced
<b>Oct 1975</b>	Consul name discontinued
<b>July 1977</b>	Granada 2.5 & 3-litre discontinued
<b>June 1981</b>	Capri 3-litre discontinued
<b>July 1988</b>	Transit 3-litre discontinued